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Where Are the Airlines Headed? Implications of Airline Industry Structure and Change for Consumers

The airline industry is undergoing unprecedented change. This paper explores the consumer impacts of recent airline industry change, in the context of its oligopoly market structure and current industry environment. Economic and noneconomic events, increasing competition from low-fare carriers, technological developments, and changes in industry practices are transforming consumer travel and interaction with airlines. Consumers can anticipate more direct flights, increased price transparency, and increased fees and time cost of security.

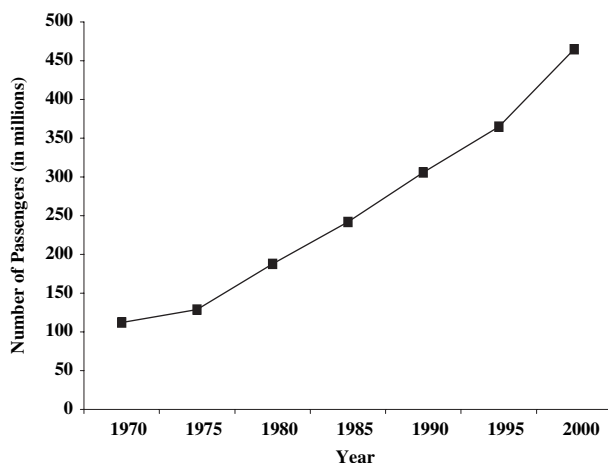
In 2001, commercial airlines carried nearly 450 million passengers for leisure, personal, and business travel, an increase of approximately 250% since the 1978 industry deregulation (U.S. Department of Transportation Bureau of Transportation Statistics 2002) (see Figure 1). Despite this long-term growth, the number of passengers increased only about 1.5% annually from 1997 to 2001 (U.S. Department of Transportation Bureau of Transportation Statistics 2002). The airlines were buffeted by both economic and exogenous factors that coincided with particular force. In 2002 and early 2003, virtually every major carrier was under bankruptcy protection or claimed to be on the verge of bankruptcy.

Since the late 1970s, airlines have endured two waves of dramatic change and restructuring that heavily affected consumers and their travel decision making. The first wave occurred postderegulation with fare competition, industry expansion, and development of the hub-and-spoke system. The second wave occurred through industry consolidation in the latter half of the 1980s (Kim and Singal 1993). Consumers are now impacted by a third wave of changes in the industry, the most radical since the 1978 deregulation. These structural changes are particularly evident in the ticket procurement process, the hub-and-spoke route network infrastructure, industry consolidation, and the market factors that led to the emergence of low-fare carriers.

Numerous researchers (Brueckner, Dyer, and Spiller 1992; Kim and Singal 1993) have analyzed the industry with empirical studies emphasizing

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FIGURE 1
Airline Revenue Passengers^a



^a Passenger numbers represent "revenue passenger originations," which represent a single passenger trip.

Source: U.S. Department of Transportation Bureau of Transportation Statistics. 2002. Historical Air Traffic Statistics, Annual 1954-1980 & Historical Air Traffic Statistics, Annual 1981-2001. Online at www.bts.gov.

the competitive interaction and pricing behavior of airline firms in an oligopoly structure in the wake of mergers. Other analyses (Borenstein 1989; Hendricks, Piccione, and Tan 1995, 1997) examined the effect of hub-and-spoke networks on airline competition, the competitive effects of the industry's significant entry barriers (Strassmann 1990), and the effect of low-fare carriers (Morrison 2001).

The objective of this paper is to explore the impacts of airline industry change on consumers, in the context of the airline oligopoly market structure and current environment. We examine the effects of recent developments in technology, route networks, and competitive structures on the airline industry, providing a basis for future empirical analysis of the impacts of these changes. We discuss the airline industry oligopoly structure, the economic and exogenous milieu of airline transport and travel decision making, and the impacts of technological change on airlines and consumers, as well as the current state of the industry. Finally, we present our perspective of how the industry structure and its changing competitive environment may affect consumers.

AIRLINE INDUSTRY STRUCTURE

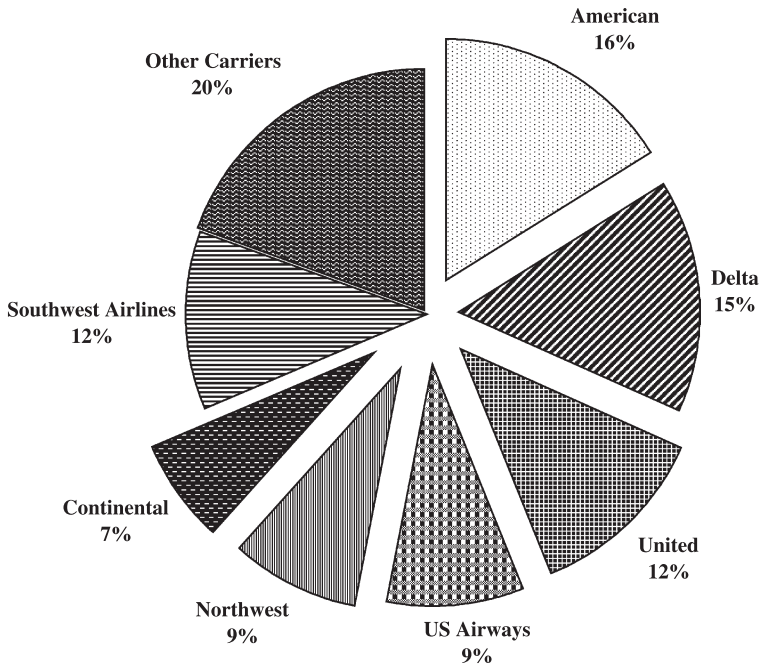
The airline industry is characterized by an oligopoly market structure, a form of imperfect competition in which a limited number of firms

dominate the industry.¹ Oligopoly firms have market power in setting or altering prices for their products by establishing various output levels. Since oligopoly firms produce similar outputs and compete with their industry rivals, any action an oligopoly firm takes is noticed by its competitors. Consequently, rivals may react with price-cutting or other attempts to enhance market share. Thus, the firms in an oligopoly are interdependent, and each recognizes that its market power is vulnerable to erosion by competitors or new market entrants.

The standard measure of oligopoly market power is the industry concentration ratio. This ratio relates the market share of the largest firms in the industry to the size of the entire market (Schiller 2003). In 2001, the six major airlines had almost 70% market share of U.S. passengers, and the largest low-fare airline, Southwest, commanded an additional 12%, leaving only 20% of domestic passengers among the remaining smaller carriers, as shown in Figure 2 (Air Transport Association 2002).

The Herfindahl–Hirschman Index (HHI) is an alternative approach to assess market power in the form of industry concentration. The HHI gives

FIGURE 2
2001 Market Shares of Airline Industry



Source: Air Transport Association. 2002 ATA Annual Report. Online at www.airlines.org.

a broader measure of dispersion by accounting for the market share of each firm rather than the combined market share of the largest firms. The HHI is calculated by taking the sum of squares of the market shares (MS) of all firms in the industry as

$$\text{HHI} = \sum_{i=1}^n (\text{MS of firm } i)^2$$

$$+ (\text{MS of firm } 2)^2 + \cdots + (\text{MS of firm } n)^2.$$

The higher the HHI, the greater is the industry concentration. For example, if an industry has only one firm, the HHI will be 10,000. In 2001, the airline industry had an HHI of 1,180 (based on total operating revenue data of the top 20 airlines), but the HHI of the six largest airlines alone was 1,130 (Air Transport Association 2002). For reference, the U.S. Department of Justice generally prohibits mergers in an industry with an HHI concentration above 1,000, if the merger will increase the industry HHI by 100 points (Rhoades 1993; Schiller 2003).

A critical characteristic of many oligopolies is the requirement of high capital investment to build capacity, which results in high fixed costs. This is clearly the case of the airline industry, with approximately two-thirds of the cost structure as fixed costs (Air Transport Association 2002).² According to Pettit and Murphy (2001), the airlines cannot consistently produce sufficient revenues to cover total fixed costs or earn stable profits because there is too much capital in the industry.

Given fixed capital requirements and flight volumes, the number of passengers can be increased at nominal marginal cost for each flight, decreasing average cost. As Coy (2002) notes, this provides substantial incentive for airlines to fill every seat, even at reduced fares, because unfilled seats represent lost revenue. In effect, airline seats are perishable goods once a flight departs. In response to these economic incentives, airlines practice price discrimination to sell the maximum number of seats on each flight.

Oligopoly firms, such as airlines, can potentially produce efficiencies that provide better or lower-priced products to consumers. Airlines may achieve economies of scale by route optimization to increase load factors, more efficient use of existing aircraft fleets, decreasing maintenance costs, and leveraging overhead costs for lower operating costs through synergies (Pettit and Murphy 2001), as well as by utilizing various forms of code-share alliances (Sharkey 2003) and cross-ticketing privileges, permitting route expansion and new connecting links. For example, in 2004,

Northwest Airlines, Delta, and Continental agreed to permit booking on each other's flights. While this near-merger strategy is aimed at passenger retention, Sharkey (2003) suggests that it is also likely to reduce flights to smaller or weaker markets.

Although airlines may use oligopoly market power to restrict competition, new innovative firms can carve out a niche, which is the strategy of the low-fare regional airlines. Pre-9/11 airline industry studies (Borenstein 1989; Hendricks, Piccione, and Tan 1997) illustrate that well-established hub-and-spoke route networks present a considerable, but possibly penetrable, barrier for new airlines. Although high entry costs of aircraft acquisition and other capital requirements make entry difficult, the industry appears more contestable (e.g., imperfectly competitive but subject to potential entry if warranted by prices or profits) post-9/11, as evidenced by the growth of low-fare carriers. These market entrants can erode a dominant carrier's market share, even at large hub airports.³ Unlike their larger competitors, several of these new market entrants are profitable and continue to experience growth.

Although industry consolidation is expected to achieve increased capital efficiency, antitrust considerations may prevent some mergers, even between smaller airlines. Borenstein (1992) suggests that price regulation will be needed as industry consolidation occurs. Blair and Harrison (1999) and Moorman (2000) conclude that antitrust provisions need to be modified and strictly enforced to protect new entrants from unfair competition and anti-competitive acquisitions. Such antitrust activities include prohibiting price undercutting by established carriers or blocking proposed mergers. Kim and Singal (1993) found that mergers between two major carriers serving a single market result in a significant increase in market power and generate higher fares for consumers. However, Brueckner, Dyer, and Spiller (1992) found that markets served by more than the two merging carriers generally did not experience a significant increase in fares.

The market power characteristics of price determination, product differentiation, economies of scale, and contestability with low-cost competitors indicate that airlines are an inherently unstable industry—a problem typical of industries with high capital costs. Airlines build excess capacity during macroeconomic expansion, which becomes all too apparent during the subsequent downturn. When industry sales decline, airlines compete for a shrinking passenger base, and those with the lowest cost structures will be the most likely survivors. As Dreazen, Ip, and Kulish (2002) note, such an industry shakeout often results in mergers or acquisitions and a smaller, possibly more competitive, industry. This appears to be the airline-competitive scenario in 2004.

CURRENT ECONOMIC AND NONECONOMIC ENVIRONMENT

In the past few years, the airline industry has been besieged by a series of unpredicted and uncontrollable exogenous or noneconomic factors, including major international events. Unprecedented terrorist acts involving commercial aircraft, the spread of the severe acute respiratory syndrome (SARS) virus, and a global economic downturn had measurable adverse effects on airline load factors (e.g., percentage of seats occupied). The SARS epidemic particularly impacted airlines with a strong presence in Pacific routes (Carey, Stringer, and Trottman 2003). The devastating terrorist attacks of September 11, 2001, impacted consumers with added travel time for extensive security checks. Dramatic declines in passenger traffic following each national terrorism alert reveal the continuing impact of terrorism (Bedard, Mazzetti, and Barnes 2003). Rising variable costs for fuel, coupled with high and inflexible fixed costs, further reduce the airlines' ability to compete on the basis of price (Air Transport Association 2002; U.S. Department of Transportation Bureau of Transportation Statistics 2003).

The occurrence of these exogenous events during an economic recession followed by an extended period of slow macroeconomic growth exacerbated their adverse impacts. Even before the devastating terrorist attacks, the airline industry experienced effects of the economic slowdown that began in early 2000; the industry continued to languish, despite receiving \$5 billion in government grants following the terrorist attacks (Becker 2001). The recession and slow economic growth reduced the business travel base, on which airlines depend for their most lucrative sales of high-priced seats. Rising unemployment levels increased consumer hesitancy to purchase leisure travel. Consumer discretionary travel was further affected by decreased household asset values, due to substantial stock market declines. The wealth effect that fueled the extended expansion of airline travel during the 1990s operated in reverse as consumer assets diminished. Newman (2003) notes that the market for air travel is changing in unanticipated ways that indicate continuing slow growth in passenger travel even without a new terrorist incident. Sharkey (2003) projects that domestic passenger travel is unlikely to reach the 2000 level of almost 700 million until 2008.

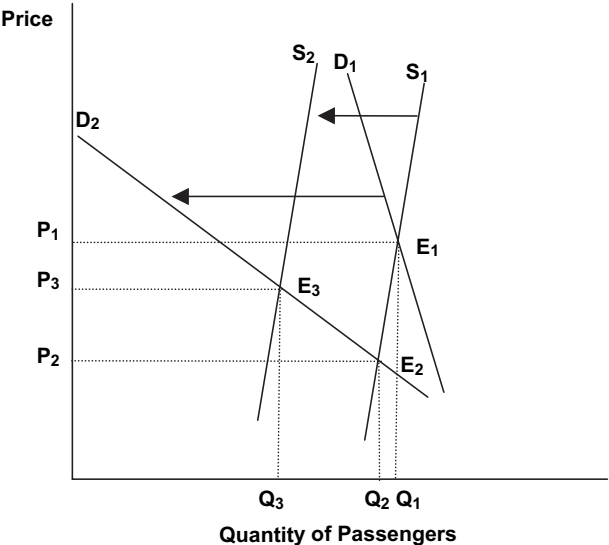
The growth of low-fare, highly competitive airlines is an additional factor motivating competitive change in the airline industry. The major airlines generally enjoyed little competition from low-fare carriers until the late 1990s. With the notable exception of Southwest Airlines, low-price carriers were unknown in many U.S. markets. Most other low-fare airlines have been relatively short lived, often becoming victim to aggressive

competition from major carriers (Bailey 2002; Blair and Harrison 1999). Prior to 2000, Southwest encompassed 75% of the total passengers flying low-price airlines (Bailey 2002). While Southwest impacted the markets it served by considerably reducing competitive fare prices (known as the “Southwest Effect”), it generally avoided direct competition with major airlines (Bailey 2002; Das and Reisel 1997; Morrison 2001) and focused on medium-sized markets in the Pacific west and southwest.

The cost structure of new market entrants permits considerably lower cost per seat-mile, generating profitability at lower fares and load factors. For example, Southwest breaks even when its planes are less than 60% full, but the large carriers may require 90% occupancy to break even (Federal Reserve Bank of Atlanta 2003). The economy carriers have lower pay scales, due to non-unionized labor forces; smaller, more fuel-efficient aircraft; and quicker turnaround times, all of which reduce operational overhead (Federal Reserve Bank of Atlanta 2003).⁴ Newman (2003) estimates low-cost carriers could double their market share to 40% of seats before their growth levels off.

Macroeconomic and microeconomic market factors in the airline industry have reduced demand and increased elasticity of demand (e.g., responsiveness of buyers to a change in price). For example, we demonstrate in Figure 3 that demand for airline tickets has decreased and also become

FIGURE 3
Effects of Change on the Airline Industry Market



more elastic (become flatter, demonstrating greater price change responsiveness) as potential passengers weigh alternative travel modes. This is shown by a decline in price from P_1 (at E_1) to P_2 (at E_2). Such changes in demand would motivate an oligopoly industry to reduce supply, and the airlines have responded by decreasing the supply of passenger seats to reduce costs and maintain prices (from P_2 to P_3 at E_3).⁵ Further, technological changes in society and within the airline industry have reduced the industry's ability to increase prices in the present milieu.

EFFECTS OF TECHNOLOGICAL CHANGE

Broad-based technological changes in society, as well as within the airline industry, have affected airline and consumer travel decision making. Two long-term aspects of the airline industry, purchasing tickets through travel agencies and the airline hub-and-spoke route patterns, are rapidly changing.

Since over 160 million Americans now have access to the Internet, the advent of competitive direct airline ticket sales, on both individual airline and discount travel Web sites, has revolutionized the marketing and selling of tickets (Computer Industry Almanac Press Release 2002). In 2002, over 39 million people booked travel using the Internet, a 25% increase from 2001 (Travel Industry Association of America Press Release 2002). The growth of online bookings has been exponential, from \$276 million in 1996 to \$827 million in 1997 to \$3.2 billion in 1999 (Miller 1999), resulting in considerable cost savings for airlines. For example, for America West Airlines, a ticket sold through a travel agent costs \$23, while a ticket sold over the Internet costs about \$6 (Miller 1999). Savings from Internet sales have reduced distribution and selling costs by one-third, to less than 10% of an airline's total costs (Miller 1999).

While the airline industry benefits from the cost saving of online purchases, consumers also benefit from greater price transparency and choice among a large number of fares. Price transparency also mandates that airlines adapt to more price-conscious consumers who have the ability to compare price options and fares across airlines. Heightened competition and more knowledge about substitute flights increase consumer price elasticity and intensify the downward pressure on fares.

The elasticity of demand for leisure travel⁶ airfares, which comprise almost 85% of all airline tickets purchased (Tully 2001), is a relatively high 2.4 (Mackinac Center for Public Policy 1997). For example, a 10% fare reduction potentially increases sales by 24%. Thus, consumers are highly responsive to price changes, and most choose the lowest fare available, regardless of the airline. With the ability of price-discriminating consumers

to compare fares, online purchasing of airline tickets increasingly resembles buying commodities. In contrast, the elasticity of demand for business travel has traditionally been an inelastic 0.1 (Mackinac Center for Public Policy 1997); however, this may change due to the increasing number of substitutes and travel delays. The airlines confront thin commodity profit margins, and their inability to increase prices is likely to continue as online purchasing increases.

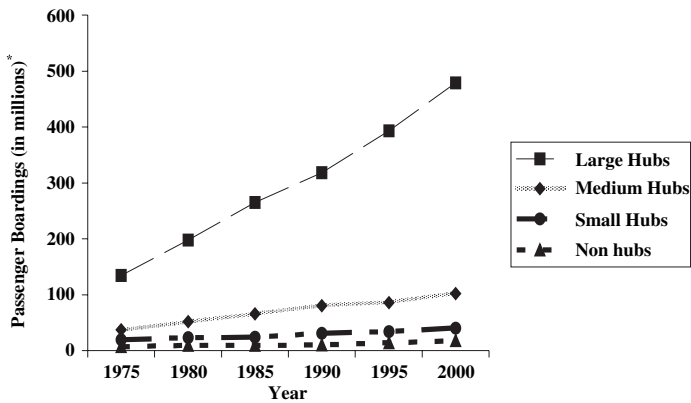
Developments in videoconferencing, webcasting, and other forms of advanced telecommunication technologies also impact the airline industry. For numerous business travelers, and consumers with access, video conferencing is improving and increasingly available (Newman 2003). For example, many college students now take classes or have job interviews online at distant locations from their home campus, and businesses conduct group meetings or interview candidates via streaming audio/video, reducing the time and expense of airline travel (Cope 2002).

The hub-and-spoke route infrastructure system is another aspect of the airline industry undergoing change. This system was initiated and expanded in the 1970s following deregulation and the development of urban mega-airports. The former regionally based "local service" carriers and the larger "trunk" carriers, which carried passengers on longer routes, merged and formed the hub-and-spoke system (Bailey 2002). In this structure, passengers fly to a "hub" airport, then board a connecting flight to their destination at a "spoke" airport, allowing airlines to aggregate passengers for longer flights on large planes. As depicted in Figure 4, the sharp growth between 1975 and 2001 in the number of flights from hub markets illustrates the system's dominance in the airline industry infrastructure.

The hub system may cause higher fares for consumers traveling between one airline's hub airports due to the greater frequency of flights between the two markets (Borenstein 1989; Sizeable 'Yield Premium' in Hub Markets Since September 11" 2002). Brander and Zhang (1990) conclude that this provides a type of product differentiation, possibly allowing premium fares. Berry (1990) indicates that consumers put a higher value (willingness to pay a higher fare) on a hub airport at their origin than at their destination. An added consequence of hub domination is the ability to engage in predatory pricing to ward off market entrants, especially new low-fare carriers. Another problem at hub airports is that large carriers often control long-term gate leases, making it difficult for new entrants to gain access to gates at an airport dominated by a single carrier (Bailey 2002).

Although the hub system plays an important role in aggregating passengers, reliance upon one airport as an integral part of an airline's route infrastructure can cause significant noneconomic problems for both consumers

FIGURE 4
Passenger Boardings by Hub Size^a



^a A "hub" is defined by size in terms of total boardings for a given market. A market may have more than one airport (e.g., the New York City metropolitan area). For purposes of this figure a "hub," as defined by the Department of Transportation, may not be a hub airport for an airline; however, most large markets contain at least one airline hub.

Source: U.S. Department of Transportation Bureau of Transportation Statistics. 2002. Historical Air Traffic Statistics. <http://www.bts.gov>.

and airlines. For instance, an external disruption at a hub airport, such as a severe weather event or air traffic control problem, may paralyze a large airline's entire operation. The hub airport problems, resulting in longer delays and travel time, increase the demand for direct flights, especially by business flyers with time constraints and higher time costs than leisure consumers.

IMPLICATIONS OF AIRLINE CHANGE FOR CONSUMERS

Changes in the airline industry have numerous important implications for consumer travel decision making. Overall, consumers can anticipate a continuation of current trends. With more Internet ticket purchases, increasing ticket price transparency and competition will maintain downward pressure on prices. However, ticket prices will be supplemented with more fees, surcharges, and taxes for security costs. For example, the 2003 excise tax on airline tickets was 22%, an 8% increase in a decade (National Public Radio 2003). Due to the high price elasticity for leisure travel, airlines pass these charges forward as surcharges to consumers, who ultimately bear the burden of paying for increased security.

Airport security measures increase travel time costs and related inconveniences, inducing many travelers to drive rather than fly. To reduce consumer travel time and delays attributed to the hub-and-spoke system,

the number of direct or point-to-point flights will increase. While the hub-and-spoke system will remain in some reduced form, direct flights will become more feasible as major airlines use smaller, more cost-efficient regional jets for smaller markets (Sharkey 2003).

Amenities that were previously standard, such as in-flight meals, are being reduced or eliminated as airlines continue to cut costs. Some airlines currently sell snacks and meals on board, practices that are likely to expand. However, newer high-tech fixed-cost amenities, such as individual television consoles and data ports, will become increasingly available for travelers, as airlines search for competitive ways to lure passengers (Newman 2003).

Consumers will also experience effects from industry consolidation to correct overcapitalization and the resulting market failure of allocative inefficiency (more than optimum resources in the industry). Although consolidation may increase market power of large merging airlines, such power will not go unchecked. Attracted by potential profits, additional low-fare competitors are expected to enter the fray. Profit margins for new entrants will become more attractive as the cost gap widens between low-cost carriers and larger established airlines. New entrants will fill niche markets, serving particular regions of the country or providing point-to-point service to selected markets. Because low-fare carriers serve as an effective curb against noncompetitive oligopolistic airline pricing, antitrust measures may be required to allow vulnerable start-ups to compete with existing oligopolists.

Airline competition is further promoted by substitute technology, such as increased use of videoconferencing, and alternate modes of transportation, such as the high-speed Acela train that connects Washington, DC, to Boston. Strassmann (1990) notes that substitutes may provide a greater check on market power than the threat of potential competition from new entrants.

Three possible future airline market structure paradigms are depicted in Table 1. Features of three alternative industry structures related to each of the market scenarios are listed, with anticipated economic behavior deriving from competitive characteristics and the resulting effects on consumers. The first column presents the current oligopoly market structure, and the second and third columns present potential future alternatives. One future paradigm (column 2) envisions a strongly oligopolistic industry, but with substantial competition from low-fare regional airlines, and the other (column 3) presents a comparable oligopoly without the moderating impact of robust low-fare carriers. Mann (2001) expresses concern that continued consolidation of market power into a "Big Three" or "Big Four" scenario may lead to declines in service and higher prices. We conclude that it is unlikely the airline industry will maintain its current state. Thus, as illustrated in Table 1, consumers will be impacted by major changes in the airline industry.

TABLE 1
Alternative Paradigms of Airline Industry Market Structures and Effects

Industry structure	Current Market Situation	Competitive Future Alternative	Noncompetitive Future Alternative
Economic behavior	Five or six major carriers	"Big Three" or "Big Four" airline industry	"Big Three" industry
	Some competition from smaller low-fare carriers and Southwest	Strong competition from low-fare regional carriers	Little or no competition from low-fare competitors
	Contestable, competitive oligopoly	Contestable, competitive oligopoly	Strong oligopoly structure
	More competition in markets served by low-fare carriers	Generally highly competitive	Monopolistic behavior in the absence of tight regulation
	Future of some low-fare carriers uncertain	Some monopolistic behavior in hubs and underserved smaller markets	Reductions in weak hub markets and small markets served by a single carrier
Effects on consumers	Unstable industry and some anticompetitive behavior by major airlines		Increased code-share alliances and cross-ticketing among airlines
	Reductions in unprofitable hubs; fewer flight options	More point-to-point service; overall fewer flight options	Generally higher fares in many markets
	Increasing fees/taxes shifted forward to consumers	Continued reduced fares from low-fare carrier competition	Larger markets remain relatively competitive
	Increasing taxes and time costs of security	Larger regional planes	More point-to-point service; overall fewer flight options
		More onboard paid services and more in-flight technology	Increased cross-airline ticketing
		Increasing fees/taxes shifted forward to consumers	Increasing fees/taxes shifted forward to consumers
		Increasing taxes and time costs of security	Increasing taxes and time costs of security

The airline industry is experiencing its greatest changes since deregulation. Economic developments, including increased competition from new low-fare airlines, are forcing the major airlines to become more efficient. Recent noneconomic occurrences have exacerbated the challenges caused by economic factors. Changes in technology and industry practices have resulted in substantially enhanced price transparency and more time-efficient flight options. However, the airline industry will likely remain unstable, and some price increases are inevitable due to increasing costs, particularly for fuel and security. Thus, traveling consumers will have roles both in shaping and in adapting to the dramatic changes taking place in the airline industry.

ENDNOTES

1. While the authors recognize the multiplicity of oligopoly models (Cournot, Bertrand, Stackelberg, Dominant Firm, game theoretic, Nash equilibrium, etc.) to explain the complexities of small group interaction, delineation of these various models is beyond the scope and objectives of this paper.
2. Fixed costs in the airline industry are generally composed of flying operations (flight crew, fuel, etc.) (29.9%), aircraft and traffic service (15.9%), maintenance (12.2 %), general and administrative (7.5%), and depreciation (6.7%) (Air Transport Association 2002).
3. For example, although Delta Airlines is the dominant carrier in Atlanta, with over 70% of market share (Hartsfield Atlanta International Airport Department of Aviation 2001, 2002), the emergence of low-fare carrier AirTran, which gained a 10% market share, caused Delta to lower fares and induced formation of its low-fare carrier, Song (Grantham 2002; Hartsfield Atlanta International Airport Department of Aviation 2001, 2002).
4. An example of a successful start-up carrier initiated in 2000, JetBlue garnered a small but notable 1%–2% industry market share and now serves over 20 markets (Air Transport Association 2002; JetBlue Annual Report 2002).
5. In 2004, over 800 planes or roughly 20% of the U.S. commercial airline fleet were operationally idle, parked in holding areas (Federal Reserve Bank of Atlanta 2003; Newman 2003).
6. Leisure travel is generally characterized by tickets purchased at least 14 days in advance, usually with restrictions such as fees for itinerary changes and minimum trip length requirements.

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